

CLASS - XII

SEMESTER – III

SUBJECT: PHYSICS (PHYS)

FULL MARKS: 35

CONTACT HOURS: 70 Hours

COURSE CODE : THEORY

UNIT No.	TOPICS	CONTACT HOURS	MARKS
1	ELECTROSTATICS SUB TOPICS: ELECTRIC CHARGES AND FIELDS Electric charges, conservation of charge. Coulomb's law - force between two point charges, forces between multiple charges, superposition principle and continuous uniform distribution of charges. Electric field: electric field due to a point charge, electric field lines. Electric dipole, electric field due to a dipole (at a point on its axis, at a point on its perpendicular bisector, at any point), torque on a dipole in uniform electric field. Electric flux, statement of Gauss's theorem and its application to find the field due to infinitely long straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell (field inside and outside) SUB TOPICS: ELECTROSTATIC POTENTIAL AND CAPACITANCE Electric potential, potential difference, relation between electric field intensity and potential, electric potential : due to a point charge, a dipole and system of point charges, equipotential surface and its properties, electrical potential - energy of a system of two point charges and of electric dipole in electrostatic field. Conductors and insulators, free charges and bound charges inside a conductor. Dielectrics and electric polarization. Capacitors and capacitance, combination of capacitors in series and in parallel. Capacitance of parallel plate capacitors with or without dielectric medium between the plates. Capacitances of solid and hollow spherical capacitors. Energy stored in a capacitor. Example of capacitors in our daily life (only qualitative idea).	18	8

UNIT No.	TOPICS	CONTACT HOURS	MARKS
2	CURRENT ELECTRICITY Electric current, flow of electric charge in a metallic conductor. Drift velocity, mobility and their relation with electric current. Ohm's law, electrical resistance, resistivity and conductivity. V-I characteristics for ohmic resistance, temperature dependence of resistance. Series, parallel and mixed grouping of resistances. Internal resistance of a cell, potential difference and emf of a cell, combination of cells in series and in parallel and in mixed grouping. Parallel combination of two cells of unequal emfs, series combination of n cells of unequal emfs. Kirchhoff's law and simple applications. Wheatstone bridge principle, Metre Bridge principle (end error correction not required). Potentiometer: principle and its applications to measure the potential difference and for comparing emfs of two cells and measurement of internal resistance of a cell.	16	8
3	MAGNETIC EFFECTS OF CURRENT AND MAGNETISM SUB TOPICS: MOVING CHARGE AND MAGNETIC FIELD Concept of magnetic field, Oersted's experiment. Biot - Savart law, calculation of magnetic field for linear and circular current carrying conductors and its simple applications. Ampere's circuital law and its application to infinitely long straight wire and straight solenoid. Force on a moving charge in a uniform magnetic and electric fields - Lorentz force. Motion of a charged particle in a perpendicular magnetic field (Cyclotron frequency). Force on a current carrying conductor in a uniform magnetic field. Force between two parallel current carrying conductors - definition of ampere. Torque experienced by a current carrying loop in uniform magnetic field, moving coil galvanometer -its current sensitivity. Conversion of galvanometer into ammeter and voltmeter. SUB TOPICS: MAGNETISM AND MATTER Current loop as a magnetic dipole and its magnetic dipole moment. Magnetic dipole moment of a revolving electron. Magnetic field intensity due to a magnetic dipole (bar magnet) along its axis and perpendicular to its axis. Torque on a magnetic dipole (bar magnet) in a uniform magnetic field, magnetic field lines. Magnetic properties of a material:	16	8

UNIT No.	TOPICS	CONTACT HOURS	MARKS
	magnetic permeability, magnetic susceptibility, intensity of magnetization, magnetic retentivity and coercivity. Hysteresis: B - H loop and its significance, (only qualitative idea) Earth's magnetic field and magnetic elements. Dia, Para and Ferro - magnetic substances with examples. Electromagnets and factor affecting their strengths.		
4	ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENT SUB TOPICS : ELECTROMAGNETIC INDUCTION Electromagnetic induction, concept of magnetic flux. Faraday's laws, induced emf and current, Lenz's law, Eddy current. Concept of self and mutual inductance, self-inductance of a solenoid and mutual inductance of two coaxial solenoids (qualitative ideas). SUB TOPICS : ALTERNATING CURRENT Alternating current, peak and RMS values of alternating current/voltage, reactance and impedance. Concept of phasor diagram, only resistive circuit, only inductive circuit, only capacitive circuit, LR circuit, CR circuit, and LCR series circuit, resonance, LC oscillator (qualitative idea only). Power in AC circuit, power factor in AC circuit, wattless current. AC generator and transformer.	15	8
5	ELECTROMAGNETIC WAVES Basic idea of displacement current, electromagnetic waves and their characteristics (qualitative ideas only). Transverse nature of electromagnetic waves. Electromagnetic spectrum (radio waves, infrared, visible, ultraviolet, X-rays, Gamma Rays) including elementary facts about their uses.	5	3

FOR SEMESTER III

- CONTACT HOURS FOR THEORY PART – 70 HOURS
- CONTACT HOURS FOR PRACTICAL PART – 30 HOURS
- CONTACT HOURS FOR REMEDIAL CLASSES AND TUTORIAL – 10 HOURS

SO TOTAL CONTACT HOURS FOR 3RD SEMESTER IS 110 HOURS.